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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PAPPAS, PETER

ART UNIT PAPER NUMBER

2671

DATE MAILED: 08/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/090,507

Applicant(s)

SELL, JOHN V.

Examiner

Peter-Anthony Pappas

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-18 and 20-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,3,5-18,20-23,26,27,30 and 31 is/are allowed.
- 6) ☒ Claim(s) 24,25,28 and 29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Allowable Subject Matter

1. Claims 1, 3, 5-18, 20-23, 26-27 and 30-31 are allowed.
2. In regards to claims 1, 3 and 5-9 the prior art of record fails to teach or suggest a computer memory responsive to the graphics processor, the computer memory including an image depth buffer and a hierarchical image depth buffer, the hierarchical image depth buffer containing data items that identify a nearest depth value and a farthest depth value for a first subset of a plurality of image depth buffer entries, wherein the first subset corresponds to a set of foreground pixels and wherein the plurality of image depth buffer entries associated with a plurality of corresponding pixels and the data items further include a nearest depth value corresponding to a second subset of the plurality of image depth buffer entries and wherein the second subset corresponds to a set of background pixels.
3. In regards to claims 10-17 the prior art of record fails to teach or suggest reading data items from a hierarchical image depth buffer, the data items including a near depth value and a far depth value for a foreground subset of a set of pixels and a near depth value for a background subset of the set of pixels, the hierarchical image depth buffer associated with a plurality of depth values for the set of pixels, the set of pixels including the selected pixel; and performing a comparison between the selected pixel and the data items to make a pixel visibility determination.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 24 and 28-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Greene et al. (U.S. Patent No. 5, 579, 455).

6. In regards to claim 24 Greene et al. teaches a computer system (computer graphics processing system), comprising CPU 120, memory 104 and graphics coprocessor 110, wherein said graphics coprocessor 110 is able to offload, from CPU 102, many of the memory-intensive tasks required for manipulating graphics data in memory 104 (column 8, lines 22-47; Fig. 1). A display buffer (image depth buffer), which can be stored in memory 104, comprises memory elements 302, wherein each display cell element contains a display cell value which represents an attribute of the appearance of the respective display cell (column 9, lines 12-19). Each of the said display cells has attributes associated with it such as color and a depth value (column 9, lines 1-5).

Greene et al. teaches that the basic idea of the Z-pyramid is to use a conventional depth buffer (Z-buffer) as the finest level in the pyramid and then combine four Z values at each level into one Z value at the next coarser level (column 5, lines 51-59). A depth buffer 502 (hierarchical image depth buffer) is divided into four levels of granularity or resolution designated 504, 506, 508 and 510. In the finest granularity level 504 said depth buffer has a depth value corresponding to each of the display cells

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(pixels) 204 (column 5, lines 51-59; column 10, lines 8-27; Fig. 5, Fig. 5A). Each depth element 512 (data item) can contain both Z-max (farthest depth value) elements and Z-min (nearest depth value) elements (column 11, lines 4-12).

Granularity levels 504, 506, 508 and 510 of said depth buffer 502 are comprised of sixty-four, sixteen, four and one depth element(s) 512, respectively. Each depth element in level 506 represents four depth elements from level 504. Each depth element in level 508 represents sixteen depth elements from level 504 and four depth elements from level 506. Each depth element in level 510 represents sixty-four depth elements from level 504, sixteen depth elements from level 506 and four depth elements from 508 (column 10, lines 8-7, column 9, lines 1-3; Fig. 5-6). Thus, for example, at granularity level 508 a single given depth element 512 is considered to represent the Z-min and Z-min for four depth elements 512 (multiple near and far) from granularity level 506 or instead represent the Z-min and Z-min for sixteen depth elements 512 (multiple near and far) from granularity level 504.

7. In regards to claim 28 the rationale disclosed in the rejection of claim 24 is incorporated herein.

8. In regards to claim 29 the rationale disclosed in the rejection of claim 24 is incorporated herein.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greene et al. (U.S. Patent No. 5, 579, 455), as applied to claims 24 and 28-29.

11. In regards to claim 25 Greene et al. teaches that a surface primitive 206 (first foreground object) covers (occludes) a portion of seven of the display cells 204 (column 8, lines 56-66; Fig. 2). Greene et al. fails to explicitly wherein the first subset corresponds to a set of foreground pixels. Official Notice is taken that both the concept and the advantages of recognizing that if a given object which is to be displayed completely covers a given area within a given display area that said covered area is occluded by said object is well known and expected in the art. Thus, it would have been obvious to one skill in the art, at the time of the applicant's invention, that if a surface primitive completely covers a pixel or group of pixels within a given display area that the respective Z-min and Z-max values for said covered pixel(s) would be determined by the surface primitive (foreground pixels), because for a given pixel which is completely covered there would be no visible background and thus only one depth value to assign thus reducing the amount of processing which is required.

Response to Amendment

12. In regards to the objection to the specification said objection has been withdrawn in lieu of Applicant's remarks.

13. In regards to the objection to the drawings said objection has been withdrawn in lieu of Applicant's remarks.

14. In response to Applicant's remarks that Greene et al. fails to teach the limitations of amended claim 24 Greene et al. teaches that granularity levels 504, 506, 508 and 510 of said depth buffer 502 are comprised of sixty-four, sixteen, four and one depth element(s) 512, respectively. Each depth element in level 506 represents four depth elements from level 504. Each depth element in level 508 represents sixteen depth elements from level 504 and four depth elements from level 506. Each depth element in level 510 represents sixty-four depth elements from level 504, sixteen depth elements from level 506 and four depth elements from 508 (column 10, lines 8-7, column 9, lines 1-3; Fig. 5-6). Thus, for example, at granularity level 508 a single given depth element 512 is considered to represent the Z-min and Z-min for four depth elements 512 (multiple near and far) from granularity level 506 or instead represent the Z-min and Z-min for sixteen depth elements 512 (multiple near and far) from granularity level 504.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of


the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter-Anthony Pappas whose telephone number is 571-272-7646. The examiner can normally be reached on M-F 9:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PAP


ULKA J. CHAUHAN
PRIMARY EXAMINER